REMARKS/ARGUMENTS

This is intended to be a complete response to the Official Action mailed November 18, 2005, in which claims 1-16, 21, 23-28 and 30 were rejected. Applicant has amended claims 1, 2, 3, 8, 9, 13, 16, 21, 27 and 30 herein.

Objection to the Specification

The disclosure stands objected to because of the following informalities: there is no brief description of figure 6A.

A description of Fig. 6A has been added to the specification thereby mooting the objection.

Objection to the Claims

Claims 1 stands objected to because of the following informalities: Change "through hold" to --through hole–.

Claim 1 has been amended as required thereby mooting the objection.

First Rejection Under 35 U.S.C. §102(e)

Claim 1 stands rejected under 35 U.S.C. §102(e) as being anticipated by U.S. 5,958,562 (Tsuji).

Tsuji teaches a through hole 10 which although having a non-circular cross-section, is filled with a conductive material 11 (e.g., see Fig. 2B and Col. 3, lines 14-16. The through holes 10 of Tsuji are thus not hollow as presently claimed (claims 1, 3, 8, 9, 13, 16 and 27 have been amended to indicate the through holes are hollow). The through holes of the present invention have been plated along an interior wall thereof but have not been filled with conductive material.

Tsuji therefore does not teach each and every element of the present invention and Applicant respectfully requests reconsideration and withdrawal of the rejection of claims under 35 U.S.C. §102(e).

Second Rejection Under 35 U.S.C. §102(e)

Claims 2, 9-12, 21, 23-26, and 30 stand rejected under 35 U.S.C. §102(e) as being anticipated by U.S. 5,828,555 (Itoh).

Applicant respectfully traverses.

In the rejection it is stated that:

> "...the trench extends completely around an area of the printed circuit board..." (page 4, lines 1-2).

However, it is clear from the figures of Itoh (Figs. 2-8) that the trenches do not "completely surround" an area of the circuit board as required by the present claims. The trenches of Itoh are linear and extend along only a discrete length of a portion of the PCB. None of the trenches of Itoh completely surround an area of the PCB.

In view of the above, Applicant respectfully asserts Itoh does not teach each and every element of the claimed invention and therefore respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §102(e)

First Rejection Under 35 U.S.C. §103(a)

Claims 3-8 and 28 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. 3,571,923 (Shaheen) in view of Tsuji.

Applicant respectfully traverses the rejection.

Present claims 3-8 and 28 claim printed circuit boards having hollow through holes which have a layer of electrically conductive material on the inner wall of the hollow through hole. Shaheen teaches a plated through hole having circular cross-section.

Examiner has applied the teachings of Tsuji to assert that it would be obvious to a person of ordinary skill in the art to modify the through holes of Shaheen to have non-circular cross-sections. Applicant respectfully traverses.

While Tsuji teaches through holes having non-circular cross-sections, Tsuji also teaches that the through holes are filled with a conductive material, thus are not hollow as claimed herein (see the above-response to the rejection under 35 U.S.C. §102(e) over Tsuji).

The courts have repeatedly stated that a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. V. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). Tsuji clearly teaches only filled, not hollow, through holes.

The teaching of a through hole having a non-circular cross-section cannot be taken in isolation from Tsuji while ignoring the concurrent teaching that the through holes are filled with a conductive material. Tsuji's teaching of a filled through hole clearly teaches away from the claimed invention.

Thus, a person of ordinary skill in the art would not be motivated to use only one teaching of Tsuji (a through hole with a non-circular cross-section) while discarding another teaching (through hole filled with conducting material), wherein the discarded teaching is diametrically opposed to the teachings of the present invention.

While the Applicant traverses the assertion that a person of ordinary skill in the art would modify Shaheen by the teaching of Tsuji, assuming arguendo, if the through holes of Shaheen were modified using the teachings of Tsuji, the through hole would be completely filled with a conductive material, as clearly taught by Tsuji, and thus would not be hollow, as required by the present claims.

In view of the above, Applicant respectfully requests reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

Second Rejection Under 35 U.S.C. §103(a)

Claims 13-16 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Shaheen in view of U.S. 6,037,547 (Blish).

Applicant respectfully traverses the rejection.

Present claims 13-16 claims printed circuit boards having hollow through holes which have a layer of electrically conductive material on the inner wall of the hollow through hole. Shaheen teaches a plated through hole having a circular cross-section.

Examiner has applied the teachings of Blish to assert that it would be obvious to a person of ordinary skill in the art to modify the through holes of Shaheen to have non-circular cross-sections. Applicant respectfully traverses.

While Blish teaches through holes having elliptical cross-sections, Blish also teaches that the through holes are filled with a conductive material (Col. 3, lines 41-46 and Col. 4, lines 10-15). Thus, the through holes of Blish are not hollow as claimed herein.

The courts have repeatedly stated that a prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. V. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). Blish clearly teaches only filled, not hollow, through holes.

The teaching of a through hole having a non-circular cross-section cannot be taken in isolation from Blish while ignoring the concurrent teaching that the through holes are filled with a conductive material. Blish's teaching of a filled through hole clearly teaches away from the claimed invention.

Thus, a person of ordinary skill in the art would not be motivated to use only one teaching of Blish (a through hole with a non-circular cross-section) while discarding another teaching (through hole filled with conducting material), wherein the discarded teaching is diametrically opposed to the teachings of the present invention.

While the Applicant traverses the assertion that a person of ordinary skill in the art would modify Shaheen by the teaching of Blish, assuming arguendo, if the through holes of Shaheen were modified using the teachings of Blish, the through hole would be completely filled with a conductive material, as clearly taught by Blish, and thus would not be hollow, as required by the present claims.

In view of the above, Applicant respectfully requests reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

Third Rejection Under 35 U.S.C. §103(a)

Claim 27 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Tsuji.

Applicant respectfully traverses the rejection for the same reasons provided in the response to the rejection of claim 1 under 35 U.S.C. §102(e) over Tsuji above. Tsuji teaches a through hole filled with an electrically conductive material while the present claims are directed to through holes

which are hollow. The teachings of Tsuji are contrary to the present claims in regard to the solidly filled through holes of Tsuji.

In view of the above Applicant respectfully request reconsideration and withdrawal of the rejection under 35 U.S.C. §103(a).

Secondary References

The secondary references cited in the official action (U.S. 4,845,311 and 5,522,132) have been reviewed and neither anticipates or renders obvious the present claims.

Conclusion

In view of the above, Applicant respectfully submits that the claims as pending herein are now in a condition for allowance and requests issuance of a Notice of Allowance thereof.

Respectfully submitted,

Christopher W. Corbett, Ph.D.
Reg. No. 36,109
DUNLAP CODDING & ROGERS, P.C.
P.O. Box 16370
Oklahoma City, Oklahoma 73113
Telephone: 405/607-8600
Facsimile: 405/607-8686

Agent for Applicant